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DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
REGION III

MISSOURI RIVER BASIN INVESTIGATIONS

LAND PLANNING AND CLASSIFICATION REPORT
as Relates to the Public Domain Lands
in the
CANNONBALL RIVER AREA
NORTH DAKOTA and SOUTH DAKOTA

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ACKNOWLEDGMENTS

The general information and statistics in this report have been obtained from a review and study of the published reports and the records of State, Federal and County Agencies. The sources of information include published reports of County Planning Boards, County Taxation and Ownership Records, State Extension Service, State Experiment Stations, U. S. Bureau of Reclamation, Weather Bureau, Geological Survey, Soil Conservation Service, Bureau of Agricultural Economics, Bureau of Chemistry and Soils, Bureau of Census and Production and Marketing Administration. Considerable information was supplied by local residents, ranchers and farmers.

Detailed data relating to the specific classification of the public domain were obtained by actual field examination. The field examinations and surveys were made by Ward L. Hopper, Land Economist.

The study was under the supervision and direction of Robert D. Nielson, Land Economist.

PURPOSE AND SCOPE

The primary purpose of this study is to determine the appropriate action necessary in connection with the management of the remaining unreserved unappropriated public lands in the Cannonball River area insofar as it may be affected by the plans for development of the natural resources of the Missouri River Basin. The extent of the study includes a review, analysis, and compilation of the basic facts pertinent to the general and local economy of the area and the relationship of the economy to the development plan for the basin. Detailed field investigations were made of public domain only.

SUMMARY

The Cannonball River Basin comprises part of southwestern North Dakota, and a small portion of northwestern South Dakota. It embraces an area of 4,300 square miles, or 2,752,000 acres. The Cannonball River and its principal tributary, Cedar Creek, rise in the western part of the basin and cut parallel valleys about 26 miles apart in an easterly direction across the area.

The topography is level to rolling and at intervals broken by small sections of rough, eroded badlands. A number of buttes rise from 200 to 300 feet above the level of the prairie in scattered locations. The elevation ranges from about 3000 feet above sea level at the source of the Cannonball River to 1591 feet at its confluence with the Missouri River.

The climate is semi-arid with wide variations in seasonal and annual precipitation and in temperatures. The annual precipitation ranges from 6.51 to 24 inches, with an average of 15.26 inches. The temperatures may range from as low as 50 degrees below zero to 119 degrees, Fahrenheit. The average growing season is 125 days.

Short grass, with blue grama the dominant species, is the principal vegetation type. Associated with this species are niggerwool, western wheat grass, June grass, needle and thread grass, and little blue stem. In the sandy areas, chiefly along the valleys of the streams, sand grass is dominant with Canada wild rye, green needle grass, giant sand grass and other species. Small groves of cottonwood, elm, ash and box elder trees, interspersed with buck brush, wild rose and other brush types, fringe the streams.

Morton loam is the dominant soil type over the major portion of the area, with Williams loam prevalent in the northeastern part. Alluvial soil types occur along the valleys of the streams and intermittent water courses. Soil erosion is slight to moderate on the level to rolling areas and serious on the steep lands.

The area is sparsely populated having a total population of 15,062, or less than 3 persons per square mile. The largest town is Mott with a population of 1220. About 5000 people live in towns and villages and the remainder, or 10,000, live on farms and ranches. The area is well served with railroads, highways and schools and by telephone and electric power facilities.

Agriculture is the only important industry in the basin. Wheat is the principal farm crop with over one-half of the cultivated land devoted to its production. About 65 per cent of the land in the area is tillable, but due to the small amount of rainfall and the wide variation in its distribution crop yields are uncertain. Climatic conditions have been favorable for dry land crop production in recent years and grain prices have been high, thus the area is at present in a prosperous state of affairs.

A plan for irrigation development of the area by the Bureau of Reclamation contemplates the construction of reservoirs on the Cannonball River and Cedar Creek to irrigate 17,654 acres in the valleys of these streams and to control floods.

The public domain in the area totals 904.45 acres and consists of 22 scattered isolated tracts ranging in size from .87 acres to 240 acres. Some of these tracts are located in areas proposed for irrigation and include tillable lands. The remaining tracts are chiefly valuable for grazing and are not needed for public purposes.

GENERAL DESCRIPTION

Location and Size

The Cannonball River area lies in the southwestern part of North Dakota and in the northwestern portion of South Dakota. It includes only a small part of Perkins and Carson Counties in South Dakota, with substantially all or portions of Morton, Grant, Hettinger, Stark, Billings, Slope, Bowman, Adams and Sioux Counties in North Dakota. The basin comprises an area of 4,300 square miles, or 2,752,000 acres. The accompanying map shows the location of the area and its boundaries with streams, roads, towns and other features.

Physiography, Topography and General Geology

The area is characterized by level to rolling prairies, broken at intervals by generally small sections of rough, eroded badlands. The largest areas of rough broken lands occur on each side of the valley

floors of the Cannonball River and Cedar Creek in the vininity of their junction. The principal geological formations are the Fort Union and Lance with some of their members. A number of buttes, which are conspicuous in the general level to rolling relief, occur in scattered locations throughout the area. They are the result of erosion of soft rock beneath a resistent cap, their elevations ranging from 200 to 300 feet above the level of the prairie.

The drainage area has a general eastward slope. The elevation ranges from 3000 feet above sea level at the headwaters of the Cannonball River and Cedar Creek to 1591 feet at the junction of the Cannonball River with the Missouri River.

The valleys through which the Cannonball River and Cedar Creek meander range in width from one-quarter mile or less to occasional expansive areas extending a mile or more from the stream channels. The valley plain can be divided into two general subdivisions, namely, bottomlands and lower benchlands. The bottomlands are generally cut into small tracts by the meandering streams which flow in narrow steep walled channels 20 to 30 feet deep. They are often isolated by bends of the stream, cut banks and steep escarpments 100 feet or more in height. The lower benchlands lie from 20 to 60 feet above the bottomlands.

The water flow of the streams is erratic and damaging floods often occur. One of the greatest floods of recent years occurred in the spring of 1943.

Climate

The climate in this area is classified as semi-arid, and has wide variations in annual and seasonal precipitation and temperatures. The annual precipitation has ranged from 8.63 and 6.51 inches in 1934 and 1936, respectively, to 24 inches in 1944, with an average of 15.26 inches. In years of average and above average precipitation good crops are general, but in years below normal or dry years the yields may be low crops or a complete failure. Temperatures may range as low as 50 degrees below zero in winter to as high as 119 degrees Fahrenheit in the summer. The average growing season is of sufficient length to mature grains and general farm crops. Heavy snow storms, blizzards and prolonged cold spells necessitate shelter for livestock and supplemental feeding. Table No. I shows the climatic conditions of the areas as indicated by representative weather stations.

TABLE I

CLIMATIC RECORDS AS SHOWN AT ALL STATIONS IN THE AREA OR IN PROXIMITY OF AREA(1)

Station	Temperature			Length of Record (Yrs.)	Average Frost Free Period (Days)	Average Precipitation			Location of Sta. in Part of Area Study
	Length of Record (Yrs.)	Maximum (oF.)	Minimum (oF.)			Length of Record (Yrs.)	Annual (In.)	In Growing Season(2) (In.)	
North Dakota:									
Hettinger	32	113	-47	31	121	32	14.16	10.50	S.W.
Bowman	19	112	-43	20	129	24	14.73	10.26	S.W.
Amidon	13	103	-38	11	122	17	15.66	10.87	W.Extreme
New England	33	114	-46	36	117	40	14.36	9.97	N.W.
Mott	32	114	-47	31	121	32	16.32	10.87	Central
Carson	25	116	-43	26	119	27	15.66	10.55	N.E.
Fort Yates	17	119	-50	16	132	22	15.15	10.80	S.E.
South Dakota:									
Lemmon	27	115	-45	26	134	27	14.54	8.41	S.Cent.
McIntosh	21	114	-58	18	130	16	16.81	11.40	S.E.
AVERAGES	24	113	-46	24	125	26	15.26	10.40	

(1) Climate and Man, 1941 Year Book of Agriculture, U.S. Dept. of Agriculture.
(2) May to September, inclusive.

Vegetation

Short grass is the dominant vegetation type in the area, the principal specie being blue grama (Bouteloua gracilis). Other prominent species include niggerwool (Carex filifolia), western wheat grass (Agropyron smithii), June grass (Koleria cristata), needle and thread grass (Stipa comata) and little blue stem (Andropogon scoparius). Wheat grass is most prevalent on heavy soils and niggerwool on the light. A number of weeds make a hardy growth during the early part of the growing season, and fringed sagebrush (Artemisia frigida) is common throughout the area.

In the "Sand Hill" area, northeast of Carson, and in areas along the draws and in the alluvial flood plains of the Cannonball River and its tributaries, where sandy soils are prevalent, sand grass (Calomvilfa longifolia) is the dominant grass species. Other prominent grass species in these areas include giant sand grass (Calomvilfa gigantes), little blue stem (Andropogon scoparius), green needle grass (Stipa viridula), needle and thread (Stipa comata) and Canada wild rye (Elmyus canadensis). The alluvial flood plains of the Cannonball River and its tributaries, where the water table is shallow, support groves of cottonwood, elm, box elder, and ash trees interspersed with brush types, including rose (Rosa spp.) buck bush (Symphoricarpos spp.), buffalo berry (Lepargyrea spp.), wild plum (Prunus spp.) and willows (Salix spp.). The grazing capacity of the native range lands of the area ranges from 1 to 5 acres per animal unit month.

Soils

The dominant soil types covering the major portion of the area are of the Morton Series(1). The Williams Series comprise part of the northeastern portion of the area. The valley plains of the Missouri and Cannonball Rivers and their tributaries have alluvial soils.

The Morton Series are formed from shales and sandstones. The Morton loam is the dominant type in the major part of the area. It is a dark, grayish-brown loam soil, with a surface layer generally five or six inches in depth. Both the surface and subsurface drainage are good. This soil is productive and the surface is chiefly undulating to rolling, a large part being dry farmed. The sharply, rolling to hilly and broken phases of Morton loam occupy chiefly the breaks of the Cannonball River, Cedar Creek and their tributaries in the eastern part of the area. This soil where the surface is level to undulating and rolling is not subject

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(1) Reconnaissance Soil Survey of Western No. Dak. U.S. Dept. of Agriculture. Detailed Soil Surveys cover only a small part of the area.

to significant erosion by water, but many areas are subject to wind erosion when the surface is not protected by vegetation. Scattered tracts of Morton clay loam and clay and Morton sandy loams occur throughout the area. These tracts are small in the western part of the area but in the eastern part the acreage in the aggregate is considerable. These types are very similar to the Morton loam, the Morton clay loams and clays having a more heavy texture and the Morton sandy loams containing more sand.

The Williams Series, of which the Williams loam is the dominant type, occupy the glaciated part of the area. This soil was formed from glacial drift and till. The surface soil is dark grayish-brown ranging in thickness from six to ten inches. The lower subsoil begins at a depth of about 18 inches and is grayish-yellow or almost white owing to its high content of lime. In places the surface is gravelly or stony, but in general the soil is friable and productive. Both surface drainage and internal drainage are good, and erosion is not serious. About one-half of this soil type in the area has a level to rolling surface and one-half has a sharply rolling to hilly or broken surface.

The alluvial soils occurring along the valley plains of the Missouri and Cannonball Rivers and their tributaries vary considerably in texture and include alluvial sands and sandy loams, alluvial loams and alluvial clay loams and clays. Very little of these lands are cultivated due to the very sandy character of the soil, the small size and isolated nature of the arable tracts. In addition, these lands are subject to occasional inundation. Without irrigation these lands are far less productive than the upland prairie soils. Much of the soil is classed as "Banks loamy fine sand", which is the most sandy soil of the stream bottoms. The surface soil is chiefly fine sand, and the land has a billowy or hummocky relief, probably the result of wind action. Areas of this soil type are poorly adapted to crop production and have a low grazing capacity because of their inaccessibility due to brush and trees and to the coarse and unpalatable nature of the grass species present.

ECONOMIC AND CULTURAL DEVELOPMENT

History, Settlement and Population

The area was first explored by white man in 1742 by Francis and Louis Verendrye, sons of the French explorer, Pierre Verendrye.(1)

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(1) Reconnaissance Report on Cannonball River Basin (Missouri River tributaries). Sept. 1940. U.S. Dept. of Int., Bur. of Reclam.

For over a hundred years after this exploration the only development was carried on by trappers and fur traders. Attempted settlement of the country by ranches brought an Indian unrising, and it was not until 1864, following General Sully's defeat of the Indians in the Kildeer Mountains to the north, that the area was really open for settlement. The extension of the Northern Pacific Railroad through the basin in the early 1880's provided transportation and many large cattle ranches were established utilizing the open public range. As settlement progressed much of the range was taken up by smaller ranches engaged chiefly in the raising of livestock, supplemented by the production of grain cash crops. During the period 1890 to 1910, there was a great influx of settlers, who depended upon the production of grain cash crops by dry farming. Many small farms of 160 to 320 acres were taken up under the homestead laws and the production of wheat gained first importance. These small acreages could not provide an adequate living, and the average size of the farm increased to about 600 acres. Wheat raising was further expanded by high prices and demand during the period 1914-1920. A large acreage of sub-marginal lands was cultivated, but farming of such lands have since been discontinued. The droughts of 1931-1936 resulted in a great set-back to both dry farming and stock raising. At the present time, however, the area is in a very prosperous condition as a result of favorable climatic conditions and high grain prices during the past seven years.

The area is sparsely populated. The total population is 15,062(1), or an average of less than three persons per square mile. About 5000 of the people live in towns and villages with the remainder, or 10,000, living on the farms and ranches. The largest towns in the basin are Mott with a population of 1220, and New England with 895. The remaining towns and villages in the area total 14, with populations ranging from 12 to 387. The towns of Hettinger (population 1138), Bowman (population 967), Lemmon, South Dakota (population 1781) and McIntosh, South Dakota (population 626) are just outside the southern boundary of the area. Carson (population 423) and Elgin (population 583) are towns on the northern border of the basin.

Public Facilities

The main line of the Chicago, Milwaukee and St. Paul Railroad skirts the southern boundary of the area through the towns of McIntosh and Lemmon, South Dakota, and Hettinger and Bowman, North Dakota. These towns and other smaller towns on the railroad provide

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(1) U.S. Census, 1940.

shipping points for grain and livestock. The interior parts of the area are served by a branch line of the Chicago, Milwaukee and St. Paul Railroad extending from McLaughlin, South Dakota, to New England, and by a branch line of the Northern Pacific extending from Mandan, North Dakota, to Mott. Towns along these branch lines are shipping points for the northern and central portions of the area.

Telegraph and telephone lines traverse the area along the railroads and substantially all villages and towns and many farms and ranches are connected by telephones. Many farms and ranches are furnished with rural electrification and additional power lines are planned for areas not yet served. Some of the farms have their own private power plants.

U. S. Highway No. 12, extending from cities in South Dakota and the east to cities in Montana, skirts the southern boundary of the area parallel to the Chicago and Milwaukee Railroad. U. S. Highway No. 85 traverses the western part of the area from north to south, connecting U. S. Highway Nos. 12 and 10, the latter being another main highway extending from St. Paul to western cities. The eastern and central parts of the area are crossed from north to south by State Highways Nos. 6, 31, 32 and 22, which also connect U. S. Highways Nos. 10 and 12. All of these roads are oiled or graveled roads. The northern part of the area is traversed from east to west by State Highway No. 21, a paved or improved road. In addition, there are many good county roads which connect the farms and ranches with the towns and highways. The larger towns in the area have excellent high schools and all towns have adequate grade schools.

Area Economy

With the exception of several small lignite mines, and the local enterprises and services essential to town and country life and welfare, the dominant industries in the area are farming and ranching. The farms, engaged chiefly in the production of wheat and small grains have returned fair to excellent incomes in years when the rainfall has been normal or above the average. However, in years of drought, incomes have not been sufficient to provide a living. The semi-arid climatic conditions, with an average annual precipitation of 15 inches and the wide variations in total and seasonal rainfall render dry farming a hazardous or at least an uncertain enterprise. Table 2 shows the wide variation in precipitation and dry-land wheat yields at the experiment station in North Dakota over a period of years.

TABLE II

RELATIONSHIP OF DRYLAND WHEAT YIELDS TO ANNUAL PRECIPITATION AT THE EXPERIMENT STATION U. S. DEPARTMENT AGRICULTURE, MANDAN, NORTH DAKOTA.(1)

(T138N-R81W)

Years	Annual Precipitation (Inches)	Yield per Acre (Bushels)
1914	23.87	32.1
1915	24.06	35.1
1916	15.07	20.5
1917	10.31	14.0
1918	13.37	13.7
1919	13.48	11.0
1920	12.69	5.6
1921	15.23	1.1
1922	17.35	21.2
1923	14.41	11.6
1924	16.25	22.1
1925	14.06	22.0
1926	11.51	2.8
1927	20.30	24.7
1928	16.85	20.7
1929	14.22	15.5
1930	17.38	12.8
1931	17.44	9.8
1932	15.76	26.3
1933	11.91	.9
1934	8.13	1.4
1935	18.30	19.7
1936	6.43	0
1937	16.09	11.2
1938	15.04	14.9
1939	13.95	18.4
1940	16.14	15.5
1941	19.72	30.2
1942	17.07	23.5
1943	21.15	24.7
1944	19.46	30.6
1945	14.65	28.0
1946	16.77	2.1(2)
1947	21.11	21.8
Maximum	24.06	35.1
Minimum	6.43	0
Mean	12.63	16.6

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(1) From 1914 to 1935, Incl., Main and South Fields averaged together. From 1936 to 1947, Main Field only. Main Field has fine sandy loam soil. South Field has a silty clay soil.

(2) Hail damage.

A land classification report by the U. S. Geological Survey(1) indicates that a large proportion (60%) of the land in the area is tillable and suitable for farming.

Table III shows the various classes of land in the area with a description of the classes following the table.

TABLE III

CLASSIFICATION OF LAND
IN
CANNONBALL AREA(1)

State and County	Total Area Acres	Farming Land Acres	Farming Grazing Land Acres	Grazing Forage Land Acres	Non-Tillable Grazing Land Acres	Missouri River Bottom Land Acres
North Dakota:						
Adams	492,200	428,000	1,200	-	63,000	-
Billings	1,800	-	1,800	-	-	-
Bowman	57,500	57,500	-	-	-	-
Grant	485,000	200,000	10,000	5,000	270,000	-
Hettinger	549,000	519,000	-	-	30,000	-
Morton	300,000	130,000	6,000	-	161,000	3,000
Sioux	505,500	134,000	20,000	-	346,500	5,000
Slope	300,000	263,000	34,500	-	2,500	-
Stark	29,000	25,000	3,000	-	1,000	-
South Dakota:						
Carson	30,000	25,000	-	-	5,000	-
Perkins	2,000	2,000	-	-	-	-
Totals:	2,752,000	1,783,500	76,500	5,000	879,000	8,000

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(1) Data obtained from Land Classification of Northern Great Plains - cooperation U. S. Dept. of Int. with U. S. Dept. of Agriculture. Land Classification by the U. S. Geological Survey.

Description of Classes

Farming Land - Areas which have a smooth surface, and in which the climatic conditions, soil texture, and fertility are favorable to the successful production of hardy grain crops in most years are classified as first-grade, dry-farming land.

Farming-Grazing Land - Second-grade farm lands comprise areas which have a smooth to gently rolling surface and in which the climatic conditions, soil texture and fertility are favorable to successful production of grain crops probably 75 per cent of the time, but yields are normally somewhat less than those of first-grade farming land. These lands may be considered as sub-marginal dry farming lands.

Grazing-Forage Land - Grazing-forage land comprises areas which have a smooth to gently rolling surface, and in which the climatic conditions, soil texture, and fertility are such that grain crops can be successfully produced only occasionally during the most favorable years. These lands are best suited to grazing use.

Non-tillable Grazing Land - These lands generally comprise rough, broken slopes and plains dissected by erosion into rough creeks and badlands, as well as gravel terraces and other areas not susceptable to successful cultivation. Their primary use is grazing and wildlife habitat.

Missouri River Bottom Land - The flood plains or bottom lands of the Missouri River have soils of alluvial material ranging from very find loam to sand. It includes three fairly well defined types of land. The first type is the cottonwood land which lies less than 15 feet above the river, the second type is valley sage land, which lies between 15 and about 25 feet above the river, and the third type embraces the remaining land, most of which lies more than 25 feet above the river and in general is not actually part of the flood plain but embraces land lying at the base of the bluffs bordering the valley. The cottonwood type is contiguous to the river, and the lower lands are subject to flooding, which render them unsuitable for cultivation. However, alfalfa can be grown successfully on land of this type where the high water does not remain long enough to drown the crop or leave a heavy silt deposit which smothers it. The valley-sage lands can be cultivated without serious interference from flooding, but for small grain crops this land generally must be irrigated. Alfalfa started on land of this type either by irrigation or during a year of abnormally high rainfall often grows successfully with irrigation.

Farm Crops - The farm crops produced in the area with their acreages and values are shown in Table IV.

TABLE IV(1)

ACREAGE, YIELD AND VALUE
OF
CROPS PRODUCED IN AREA

Crop	Acreage	Yield Bushels or Tons	Average Yield per Acre	Value in Dollars
Wheat(2)	575,312	9,182,482 Bu.	15.9 Bu.	$12,740,882
Barley(3)	123,397	2,922,806 "	23.7 "	2,679,826
Oats(3)	73,021	2,677,269 "	36.7 "	1,594,937
Flax(3)	15,589	144,456 "	9.2 "	400,823
Rye(3)	5,801	60,023 "	10.3 "	55,376
Mixed Grains(4)	1,034	26,967 "	26.0 "	22,912
Corn(5)	68,160	341,400 "	21.1	1,027,441
Wild and Tame Hay(6)	171,585	162,975 T.	.95 T.	1,125,632
Sorghams(7)	6,381			42,027
Annual Legumes(8)	10			27
Alfalfa Seed	205	206 Bu.	1.00 Bu.	5,606
Irish Potatoes	868	65,505 "	75.4 "	91,704
Fruits & Vegetables(9)				142,941
Totals:	1,041,363			$19,930,134

(1) Compiled from U. S. Census of Agriculture, 1945, Department of Commerce, Bureau of Census. Crop yield in 1944.

(2) Includes all varieties. Spring wheat by far predominates.

(3) Threshed or combined.

(4) Small grains mixed, threshed or combined (other than flax and wheat grown together).

(5) All purposes-yield is for corn harvested for grain.

(6) Wild and Tame hay excluding specified annual legumes and sorghums.

(7) Sorghams for all purposes except for syrup.

(8) Annual legumes - Soy beans, beans.

(9) For home use and sale.

The numbers and values of the livestock and livestock products in the area are indicated in Table V.

TABLE V

LIVESTOCK AND LIVESTOCK PRODUCTS(1)

Livestock & Products Classes	Number	Value (Dollars)
All Mules and Mule Colts	134	$ 1,834
All Horses and Colts and Ponies	16,688	490,702
All Cattle and Calves	107,518	7,457,716
All Hogs and Pigs	24,922	645,787
All Goats and Kids	106	391
All Sheep and Lambs	39,945	318,837
Totals:	189,213	$8,915,267
Poultry Chickens Raised	391,202	
Poultry Turkeys Raised	17,219	
Totals:	408,421	
Value of Livestock and Livestock Products Sold		$3,673,333
Value of Dairy Products Sold		1,060,379
Value of Poultry and Poultry Products Sold		361,087
Total:		5,094,799

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(1) Information obtained from U. S. Census of Agriculture, 1945.

Land Ownership and Development Projects

There are no national forests or parks, grazing districts, stock driveways or wildlife refuges in the area. With the exception of Adams and portions of Sioux, Slope and Grant Counties, all of the area is included in established soil conservation districts or such districts in the process of organization. The public domain (Federal Land) aggregates 904.45 acres and is located chiefly in the breaks and valley plains of the Cannonball River and Cedar Creek. With the exception of about 20 small irrigation developments totaling 660 acres which are irrigated by pumping from the river, the cultivated land in the area is dry farmed. Climatic conditions during the past seven years have been favorable for dry farming and prices good. As a result, the area is in a very prosperous condition. During the drought and depression years, a large amount of private land in the area passed into county ownership because of tax delinquency. At present only comparatively small amounts of land are owned by the county. During the drought and depression years from 1929 to 1936, Grant County owned about 250,000 acres of land. In 1947, only about 6000 acres belonged to the county. Likewise, Slope County owned about 300,000 acres in the early 1930's, which had been reduced to 4,800 acres in 1947. However, the history of dry farming in the semi-arid regions indicates that periods of drought have occurred and may be expected in the future. The Bureau of Reclamation's plan for development of the area by utilizing the waters of Cannonball River and Cedar Creek for irrigation, through storage and regulation will stabilize agriculture in the area to a considerable extent by insuring a dependable feed supply for livestock during critical winter periods.

The Reclamation plan of development contemplates the irrigation of 17,754 acres of land in two separate projects, namely, the Cannonball Unit of 9,710 acres, and the Cedar Creek Unit of 8,044 acres.(1) Irrigation water for the land in the Cannonball Unit will be obtained by pumping from the Cannonball River after construction of a reservoir in Section 23, Township 133 North, Range 88 West, about 25 miles above the junction of the Cannonball River and Cedar Creek. The reservoir will impound about 40,000 acre-feet of water, will flood about 2,200 acres of pasture land and will necessitate the relocation of one mile of county road. The creation of the reservoir will provide recreational facilities for the people of the area and also a habitat for waterfowl and upland birds. The irrigable land in the unit consists of units varying in size from 50 to 1,320 acres, located from a point approximately six miles below the Cannonball Dam site to the town of Solen in Section 30, Township 134 North, Range 80 West, a distance of about 45 miles.

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(1) Reconnaissance Report on Cannonball River Basin, Sept. 1940, Bureau of Reclamation. (The development of the Hettinger Unit on upper Cedar Creek was not considered in the report because of a study of water supply indicated an insufficient supply for economic development.

The construction of the Thunder Hawk dam in Section 26, Township 130 North, Range 90 West on Cedar Creek will impound 30,000 acre-feet of water. According to the Bureau of Reclamation report, the storage is to be used to regulate the flow in Cedar Creek and provide for irrigation by pumping of lands along lower Cedar Creek. The irrigated lands consist of 14 separate areas ranging in size from 170 to 2,000 acres.

It is reported that the construction of the Oahe Dam in South Dakota will eventually flood all the bottom land of the Missouri River as far north as Bismarck, North Dakota, and also extend up the valley of the Cannonball River for a number of miles (1). In that event considerable farm land along the river bottom will be taken out of production.

THE PUBLIC DOMAIN LANDS

The public domain lands in the area consist of 23 isolated tracts, ranging in size from 0.87 acre to 240 acres. For the most part, they are surrounded by privately owned lands, but in several instances the adjoining land is owned by the state or county. Table VI shows the location of the tracts with their classification as to suitability and capability. The geographic location and isolated and scattered nature are shown on the attached map.

Tracts Nos. 1, 2, 4 to 9, inclusive, 11 and 14 occupy the bottom lands and lower bench lands in the valleys of the Cannonball River and Cedar Creeks within the areas proposed for irrigation by the Bureau of Reclamation. However, only a preliminary survey and classification of these lands have been made by the Bureau of Reclamation.

Detailed field investigation reveals that Tracts Nos. 1, 4, 5, 7, 9, 11 and 14, include lands susceptible to irrigation by pumping from the Cannonball and Cedar Creek after completion of the irrigation development plan. The soil of the irrigable lands is for the most part a fine sandy loam of an alluvial type. In many instances the surface is billowy and hummocky, and will require leveling before irrigation is feasible. Some land of this character is dry farmed but crop yields are small. The soil is subject to considerable wind erosion when dry farmed. The lands are also subject to overflow by the streams during the spring months or by flash floods during torrential rain storms. This condition should be substantially remedied under the development plan.

Tracts Nos. 2, 6 and 8 comprise small areas formed by bends in the Cannonball River and Cedar Creek, and are substantially isolated, being accessible only from one side. They are unsuitable for cultivation having a rough surface with a sandy soil. Part of the tracts are covered with stands of cottonwood, elm, ash and box elder trees with an understory of buck, wild rose and other brush. The timber has no commercial value but some is used locally for fuel, posts, and poles. The tracts serve to some extent as habitat for upland birds, such as pheasant and quail, and have some value for recreational purposes, including hunting and picnicking. However, the value of these tracts as public recreational sites and wildlife refuges is insufficient to merit their retention in public ownership because of their small size, isolated character and inaccessibility. Furthermore, the private lands in the area provide a habitat for upland birds and picnic needs. The Cannonball and Thunder Hawk Reservoirs will provide public facilities for recreation as well as wild life protection. Because of the probable close relationship to irrigation development, all of the tracts described above should be retained in Federal ownership until the development plans for the area are complete.

Tracts Nos. 3, 10, 12, 13 and 15 to 23, inclusive, include isolated tracts located outside the areas proposed for irrigation under the reclamation development plan. They are surrounded by privately owned land and in several cases adjoin county land on one side. The tracts are chiefly valuable for grazing and have no water control features or features of public value. They are not needed for exchange purposes and are not suited for inclusion in any specific state or federal land management programs. Their disposal by public sale appears advisable.

Each of the public domain tracts within the Cannonball unit, whether dry farmed, irrigated or used for grazing, does not constitute an economic unit in itself and can be most effectively managed and used under private ownership in connection with adjoining private lands.

Detailed reports of field investigation for each tract, including appropriate recommendations, have been filed in the records of the Bureau of Land Management, Region III.

TABLE VI

PUBLIC DOMAIN TRACTS IN CANNONBALL UNIT

X = Not vact 1936

Tract No.	Twp. and Rge.	Section	Total Acres	Capability Class (1)	Remarks and Recommendations
1	T 134 N R 80 W	24	17.40	V & VI	About 15 acres irrigable. Soil: sand to fine sandy loam. Retain in public ownership pending reclamation development.
2	T 134 N R 80 W	28	2.40	VI	River flood plain, suitable for grazing. Soil: sand to fine sandy loam. Should be temporarily retained in public ownership pending reclamation development.
3 X	T 136 N R 80 W	34	8.83	II & VI	About 3 acres suitable for dry farming, remainder grazing. Disposition to private ownership recommended. X
4	T 133 N R 82 W	22	15.96	II & VI	Twelve acres irrigable, remainder grazing land. Soil: sand to fine sandy loam. Should be temporarily retained in public ownership pending reclamation development.
5	T 131 N R 84 W	2	7.85	V	Five acres irrigable. Soil: sand to fine sandy loam. River bottom land to be retained pending reclamation development.
6	T 131 N R 84 W	30	.87	VI	Humocky river bottom land. May be irrigable with clearing and leveling. Soil: fine sandy loam to gravelly soil. Retain temporarily for reclamation.
7	T 130 N R 85 W	10	2.10	V	All irrigable. Soil: fine sandy loam, level. Retain temporarily for reclamation development.
8	T 130 N R 85 W	10	2.80	VII	Cedar River bottom lands suitable for grazing; now within Standing Rock Indian Reservation. Should be retained in public ownership for administration as part of Indian Reservation.
9	T 130 N R 86 W	26	7.96	V	Five acres irrigable, remainder grazing. Soil: fine sandy loam. Retain temporarily pending reclamation development.
10	T 136 N R 86 W	30	38.28	VII	Grazing land near Cedar River. Soil: rocky clay loam, rough. Recommended for disposal to private ownership.
11 X	T 131 N R 86 W	10	40.00	V	River bottom lands, mostly irrigable. Soil: sandy loams. Should be retained in public ownership pending reclamation development. X

X = No longer Vacant 1966

TABLE VI (Continued)

Tract No.	Twp. and Rge.	Section	Total Acres	Capability Class (1)	Remarks and Recommendations
12	T 131 N R 86 W	22	240	VII & VIII	Grazing and barren lands. Soil: poor. Recommended for disposal to private ownership.
13 X	T 132 N R 86 W	26	40.00	VI	Grazing land. Soil: Sandy with rocks and some gully erosion. Recommended for disposal to private ownership. X
14 X	T 132 N R 86 W	32	40.00	V & VI	Two acres irrigable, 13 acres dry farm land, remainder grazing land. Retain pending reclamation development. X
15	T 134 N R 86 W	4	80.00	VI & VII	Grazing land. Soil: sandy to rocky, sandy loam. Recommended for disposal.
16	T 135 N R 86 W	34	40.00	VII	Grazing land. Soil: sandy. Recommended for disposal.
17	T 132 N R 87 W	32	80.00	VII	Grazing land near Cannonball River. Recommended for disposal.
18 X	T 132 N R 87 W	26	40.00	VI	Grazing land. Soil: rocky loam. Recommended for disposal. X
19 X	T 130 N R 88 W	24	40.00	VII	Suited only for grazing. Contains a stock water reservoir. Disposal recommended. X
20 X	T 132 N R 88 W	8	40.00	VI	Grazing land. Recommended for disposal to private ownership. X
21	T 132 N R 88 W	24	40.00	VII	Grazing land. Recommended for disposal to private ownership.
22	T 129 W R 91 W	5	40.00	VI & VII	Grazing land. Recommended for disposal to private ownership.
23	T 131 N R 93 W	24	40.00	VI & VII	Grazing land. Recommended for disposal to private ownership.
			904.45		

1) Description of Capability Classes indicated in above table.

lass II

Arable land suited to dry farming with moderate restriction on use to control oil erosion.

(1) Description of Capability Classes indicated in above table. (Continued)

Class V

Land in this class is limited to uses other than farming by one or all of the following factors:

(a) Lack of precipitation or other water supply.
(b) Poor drainage.
(c) Surface obstacles such as trees, rocks, etc.

These lands are level or nearly so, have good soil structure, texture and productivity, and are not subject to significant erosion by either wind or water action. Lands in this class can be reclaimed or farmed if cleared, irrigated or drained or a combination of these practices applied.

Class VI

Lands in this class are not suited for cultivation either with or without irrigation, but are best adapted to permanent vegetation. Limiting factors are topography, surface features, soil conditions and fertility and drainage. These areas are moderately subject to soil erosion and require special management of uses to retain the resource in optimum condition and productivity.

Class VII

This class includes lands which are highly susceptible to erosion due to topography, steepness of slopes, soil texture and structure; but are capable of furnishing some forage for livestock or some forest products under very capable management. Lands in this class should never be cultivated or the protective vegetation cover excessively used or disturbed. These lands may have recreational, aesthetic and wildlife value.

Class VIII

Lands in this class are not suited for cultivation or for grazing or forestry, but may serve as significant watershed and have recreational and aesthetic values. They are often termed as "badlands". Other examples are excessively salty areas, sand dunes, very rocky and inaccessible areas. Many areas in this class are very subject to soil erosion, and severe restriction of use must be applied in the interest of watershed protection.

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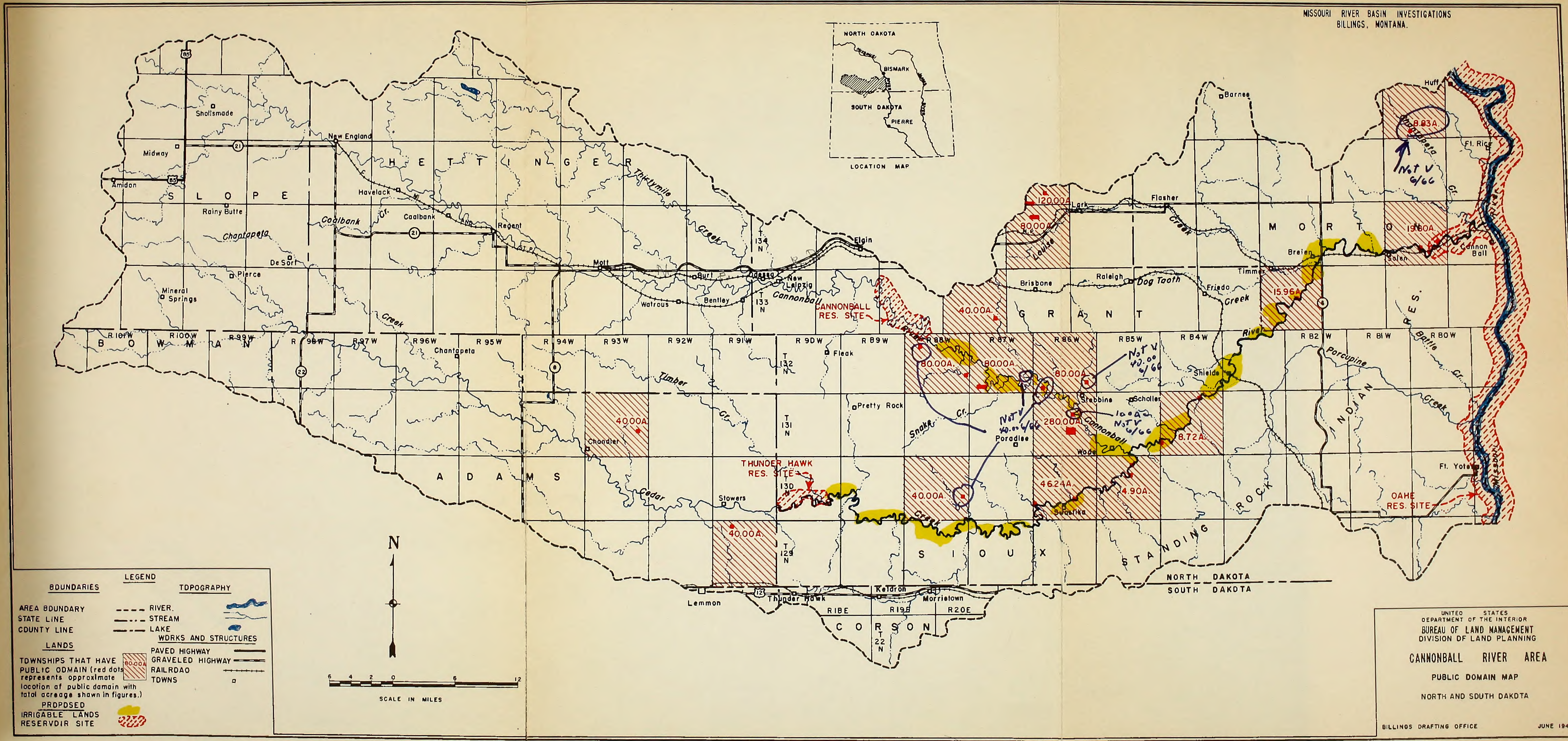

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
DIVISION OF LAND PLANNING

CANNONBALL RIVER AREA

PUBLIC DOMAIN MAP

NORTH AND SOUTH DAKOTA

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